

PHILIP MORRIS
U.S.A.
INTER-OFFICE CORRESPONDENCE
RICHMOND, VIRGINIA

To: DR. T. S. OSDENE
From: D. A. LOWITZ
Subject:

Date: JANUARY 2, 1973

PROGRAMS AND OBJECTIVES OF THE
PHYSICAL RESEARCH DIVISION
FOR 1973

/gdc

cc: Dr. H. R. Wakeham
Mr. F. E. Resnik
Mr. R. A. Graham
Mr. R. N. Thomson
Mr. K. Burns
Mr. F. L. Daylor
Dr. P. A. Eichorn
Dr. W. F. Gannon
Mr. B. J. Kosakowski
Mr. L. F. Meyer
Mr. W. Nutter
Mr. J. S. Osmalov
Dr. F. Will, III

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Goals:

1. 10 mg Marlboro
2. Menthol
3. Selective filtration
4. Cost reduction
5. New products
6. Selective delivery by rod

PHYSICAL CHEMISTRY OF SMOKE AND FILTRATION - 0105

Staff of nine

Personnel Training: Physical chemistry, kinetics

Objective: Determine how filters function adequately so that selective filtration systems can be developed. Establish how cigarette smoke and cigarette rod characteristics are related adequately to permit new cigarette products to be designed prior to their fabrication. Determine basic mechanism for filler expansion. Determine feasibility of expanding filler with water.

Program:

- | | | |
|-----------------|---|--|
| (Goal 3 & 5) | 1. Selective filtration | |
| | a. Gas chromatography + sorption kinetics, filter free-space characterization | |
| | b. Radiotracer analysis + displacement at filter surface | |
| | c. Particle size effects + composition variation with particle size | |
| (Goal 1, 5 & 6) | 2. Smoke - rod mathematical relationships + cigarette modelling | |
| (Goal 1) | 3. Smoke flavor and tar fractionation + low tar - normal flavor cigarette | |
| (Goal 4) | 4. Filler expansion - basic mechanics | { Improved ET position
and production upscaling |
| | 5. Expansion of filler with water | |

Items (4) and (5) are covered by one Research Professional, full time, plus a technician on loan from the Development Department.

Project Leader: Dr. H. A. Hartung, Senior Professional
Mr. J. F. Bebbs, Assistant Professional
Dr. J. C. Crump, Research Professional
Dr. S. Debrand, Research Professional
Mr. R. W. Dwyer, Assistant Professional
Mrs. Ruth Hale, Technician
Mr. J. S. Osborne, Research Professional
Mr. D. L. Simpson, Research Professional
Mr. L. L. Stewart, Associate Professional
Dr. D. T. Sawyer, Consultant - \$500
Dr. J. C. Schug, Consultant - \$500

Goals:

1. 10 mg Marlboro
2. Menthol
3. Selective filtration
4. Cost reduction
5. New products
6. Selective delivery by rod

1001514931

2. 10 mg Marlboro
3. Menthol cigarette
4. Processing cost reduction
5. New products
6. Selective delivery

FILTER MATERIALS - 1708

Staff of six

Personnel Training: Polymer chemistry, surface chemistry and surface physical chemistry

Objective: Search out new materials for filter systems and new methods for treating rod to remove less desirable elements from smoke, to add flavor and aroma to smoke, and to reduce the processing costs for cigarette production.

Program:

- (Goal 1) 1. Copper amine complex (Stoichiometric) + HCN removal
- (Goal 1) 2. Cobalt/alumina (Catalytic) + CO removal
- (Goal 1) 3. Permanganate/alumina (Stoichiometric) + NO_x, HCN, aldehyde removal
- (Goal 1) 4. Chlorite/alumina (Stoichiometric) + NO_x removal
- (Goal 2) 5. MP-PVC (also in paper filter as carrier for MP) + TPM Reduction
- (Goal 2) 6. Factice + TPM reduction, CP cigarette
- (Goal 3&5) 7. Systems for controlled release of menthol and other flavors
 - a. grafting to cellulose
 - b. treatment of cellulose with cryogenic NH₃
- (Goal 2&4) 8. Carbon fiber filler in rod + reduced delivery and cost reduction
- (Goal 6) 9. Compounds added to filler + CO reduction
- (Goal 6) 10. Chemical modification of smoking materials for improved flavor.

Project Leader: Dr. N. B. Rainer, Senior Professional
Dr. C. G. Dodd, Associate Principal
Dr. C. B. Hoelzel, Research Professional
Dr. A. J. Kassman, Associate Professional
Mr. D. A. Full, Assistant Professional
Mr. P. A. Wilson, Specialist
Plus one professional and one specialist to be recommended for hiring by 1973.
Plus outside laboratory services - \$3,500.

Goals:

1. Selective filtration
2. 10 mg Marlboro
3. Menthol cigarette
4. Processing cost reduction
5. New products
6. Selective delivery

1001514932

Goal:

1. 10 mg. Marlboro-like cigarette
2. Selective filtration
3. New products
4. Selective delivery

CIGARETTE PHYSICS - 1706

Staff of seven

Personnel Training: Solid state physics, applied mathematics, thermal physics, experimental physics

- Objective:
1. Develop understanding of how specific species of smoke are generated and compose adequate design equations for the process to generate new products.
 2. Determine how specific filter material candidates function and assist in making them suitable for practical filters.

Program:

- (Goal 1, 3 & 4)
1. Cigarette design
 - a. measurement of relevant rod properties
 - b. compose and solve smoke process equations
 - c. design new products

Reduce concentration of less desirable elements of smoke, also normal flavor-low tar cigarette design
 - (Goal 2&3) 2. Stability improvement of new filter material candidates
 - (Goal 1&3) 3. Characterization of flow through filters under actual smoking conditions - smoker acceptability of filter, and filter design

Project Leader: Mr. A. C. Lilly, Senior Professional
Mr. E. M. Gentry, Assistant Professional
Mr. H. V. Lanzillotti, Associate Professional
Mr. B. C. LaRoy, Research Professional
Mr. S. L. Thurston, Technician
Mr. C. O. Tiller, Research Professional
Mr. A. R. Wayte, Technician
Dr. J. C. Schug, Consultant - \$700
Dr. D. T. Sawyer, Consultant - \$500
Princeton Combustion Group - \$50,000

Goal:

1. 10 mg. Marlboro-like cigarette
2. Selective filtration
3. New products
4. Selective delivery

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4. Biological studies (effect of smoke constituents on yeast cells and other tissue)

Optical Microscopy

1. Filter studies
2. Expanded leaf
3. Trouble-shooting in manufacturing, e.g. studies of mold in tobacco
4. Examination of competitors' products

TOBACCO TECHNOLOGY MICROANALYSIS

Staff of six

Personnel Training: Biophysics, microinstrumentation, experimental physics

Objective: Provide R & D with microstructure and microgeometry analytic services

Program:

1. Microgeometry of filters, tobacco, filter materials, biological specimens, paper, etc.
 - a. scanning electron microscopy
 - b. transmission electron microscopy
 - c. optical microscopy
 - d. develop techniques for preceding
2. Microstructure of filter surfaces and filter materials
 - a. microprobe analysis
 - b. photoelectron spectroscopy
 - c. x-ray analysis
 - d. develop new techniques for preceding

Facility Leader: Mr. I. Hasegawa, Senior Professional
Mr. W. L. Carter, Research Professional
Mrs. Virginia Johnson, Associate Professional
Mrs. Laura McCray, Assistant Professional
Mr. D. L. Petri, Specialist
Mrs. Marie Smith, Specialist
General EM Consultants - \$500.00

Applications:

Scanning Electron Microscopy

1. Filtration and filter studies
2. Selective filtration
3. Expanded leaf
4. B. L. studies

Transmission Electron Microscopy

1. Filtration and filter studies
2. Selective filtration (particle size distribution studies)
3. Expanded leaf
4. Biological studies (effect of smoke constituents on yeast cells and other tissue)

Optical Microscopy

1. Filter studies
2. Expanded leaf
3. Trouble-shooting in manufacturing, e.g. studies of mold in tobacco
4. Examination of competitors' products

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TOBACCO TECHNOLOGY MICROANALYSIS (Con't)

Applications: (Con't)

Microprobe Analysis

1. Filtration studies (different composition as a function of particle size) (Analysis of deposition on filter and of filter surface)

X-Ray Analysis

1. Selective filters (structure of catalysts in filters and selective absorbents)
2. Expanded leaf studies, e.g. ammonium carbonate studies

ESCA

1. Filtration studies
 - a. Different composition as a function of particle size
 - b. Composition of deposition on filter surface, also question of whether chemisorption is occurring

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ELECTRONICS MAINTENANCE AND DESIGN

Staff of four

Personnel Training: Electronics

Objective: Maintain electronic instrumentation in R & D
and design and fabricate new instrumentation
as required.

Program:

1. Service equipment on request.
2. Routinely test and recalibrate certain instruments.
3. Develop new designs for instrumentation on request.
4. Learn new electronic techniques when feasible.

Facility Leader: Mr. A. C. Lilly, Senior Professional
Mr. W. L. Jones, Assistant Professional
Mr. L. C. Bartlam, Specialist
Mr. J. A. Ferri, Specialist
Mr. E. Renick, Specialist

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